

INTERFACE UNIT

IF-60

USER'S GUIDE

brother®

TRADEMARK ACKNOWLEDGEMENT

Reference is made in this manual to specific computers.
These products have registered trademarks as follows:

IBM-PC, PCjr	International Business Machines Corp.
APPLE II, IIe, IIc	Apple Computer Inc.
Macintosh	Apple Computer Inc.
APPLE PARALLEL CARD	Apple Computer Inc.
APPLE SUPER SERIAL CARD	Apple Computer Inc.
APPLE Image Writer	Apple Computer Inc.
Grappler +	Orange Micro Inc.
EPSON APL Type I, II	EPSON AMERICA Inc.
CCS7710	California Computer Inc.
COMMODORE 16, 64, 128	Commodore Business Machines Inc.
CARDCO C/B	CARDCO Inc.
ATARI 600, 800, 1200XL, 850	ATARI Inc.
Ti 99/4A	Texas Instruments Inc.
PHP 1200	Texas Instruments Inc.
PHP 1220	Texas Instruments Inc.
TRS-80	Tandy Corp.
SINCLAIR-QL	Sinclair Research Ltd.
BBC MICRO	British Broadcasting Corp.
HAYES Smart Modem	Hayes Microcomputer Products Inc.
Diablo	XEROX Corp.

"This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- - Make sure the printer data input cable is shielded and properly grounded.
- - Reorient the receiving antenna
- - Relocate the computer with respect to the receiver
- - Move the computer away from the receiver
- - Plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions.

- Please use a shielded interface cable shorter than 1.5m.

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- Please use a shielded interface cable shorter than 1.5m.

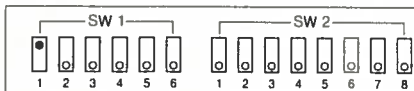
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● DIP Switch Settings (9600 bps, 8 bit, No Parity)

Normal



With ASCII Wheel (sold separately)



Important:

Be sure the DIP Switch 1-3 is ON (down).

Note:

When power is turned ON, the Macintosh is set to 9600 bps, 8-bits, no parity, with printing performed by the Apple Image Writer. If printing is performed by the IF-60, a printer driver for daisywheel printers is necessary. Most of the software designed for Macintosh is compatible with dot matrix printers only. Such software cannot be used with the IF-60. So please read the software's manual thoroughly.

COMMODORE 16, 64, 128

Appendix A

You may choose either CDCC or RS-232C connection.

CDCC CONNECTION

● Cable and Interface

Convert the Commodore Serial Bus into CDCC by using a

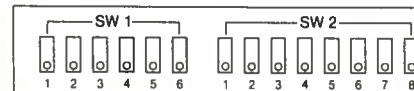
CARDCO C/B INTERFACE

A cable is attached to the conversion interface.



● DIP Switch Settings

Normal



With ASCII Wheel (sold separately)



RS-232C CONNECTION

● Cable and Interface

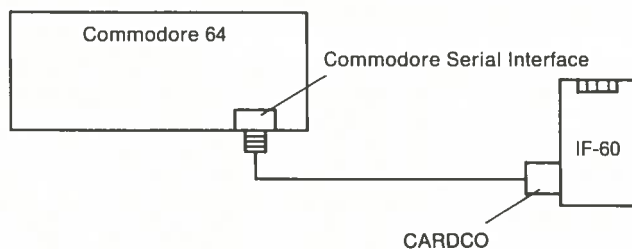
Convert the Commodore Serial Bus into RS-232C by using a

CARDCO C/B INTERFACE

Important:

Set the conversion interface DIP Switches to 300 bps, 8-bits, no parity.

A cable is attached to the conversion interface.



● DIP Switch Settings (300 bps, 8 bit, No Parity)

Normal



With ASCII Wheel (sold separately)



MACINTOSH

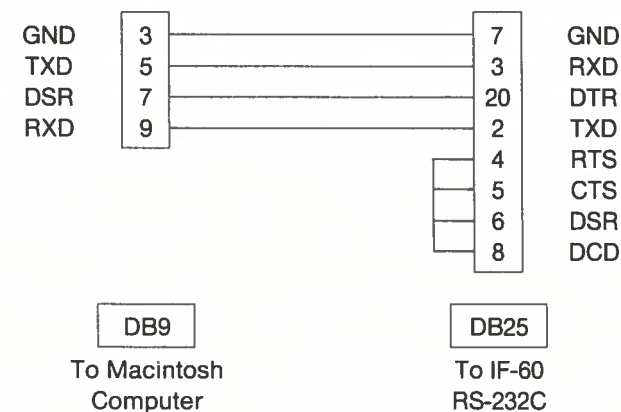
Appendix A

With Macintosh computer, only RS-232C connection is available.

RS-232C CONNECTION

● Cable

A standard RS-232C interface is provided for the Macintosh. Here is the wiring diagram of the cable.

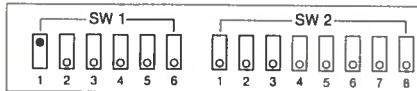


Note:

Pins not listed in this diagram should not be connected.

● DIP Switch Settings (9600 bps, 8 bit, No Parity)

Normal



With ASCII Wheel (sold separately)



Important:

Be sure the DIP Switch 1-3 is ON (down).

Note:

Although the Apple IIc is set to 9600 bps, 8-bits, no parity, when the power is turned ON, this can be changed by an enclosed SYSTEM UTILITY. Please read the Apple IIc User's Manual for details.

● Defining the Output Port as Printer Port

Use the commands:

] PR #1 to start printing through the IF-60.

] PR #1 to stop printing through the IF-60.

ATARI 600, 800, 1200 XL

Appendix A

An ATARI 850 extension interface module is provided for the Atari computer. This module allows for both CDCC or RS-232C connection.

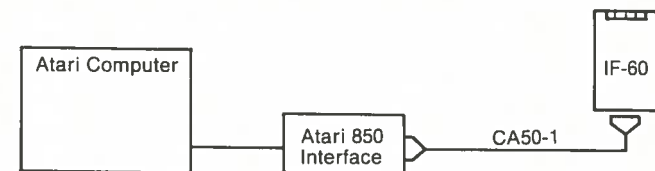
CDCC CONNECTION

● Cable and Interface

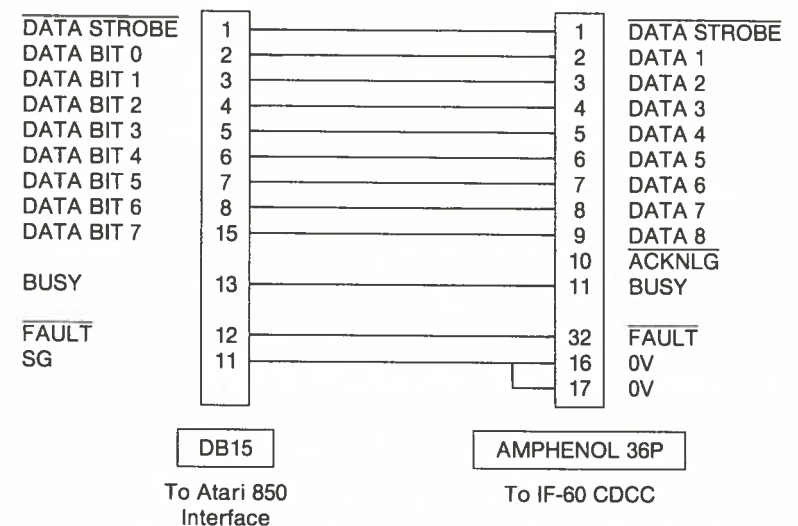
Connect a

BROTHER CA50-1 Cable

according to the following diagram.

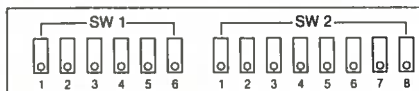


Here is the wiring diagram of the CA50-1 Cable.

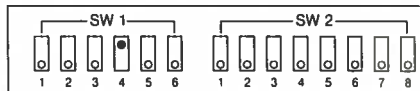


● DIP Switch Settings

Normal



With ASCII Wheel (sold separately)

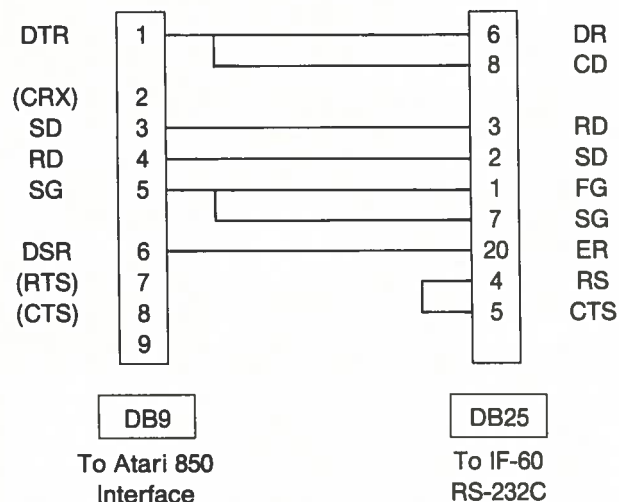


RS-232C CONNECTION

● Cable and Interface

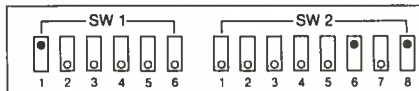
The cable supplied with the Atari computer is designed for connecting a Modem and cannot be used for connecting the IF-60.

Prepare a cable according to the following wiring diagram.

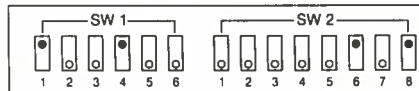


● DIP Switch Settings (300 bps, 8 bit, No Parity)

Normal



With ASCII Wheel (sold separately)



APPLE IIc

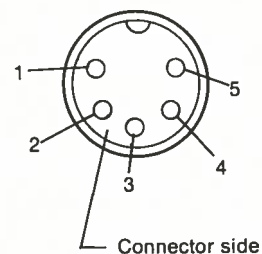
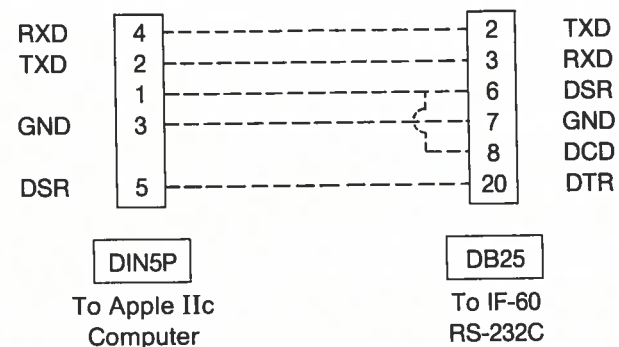
Appendix A

With APPLE IIc Computers, only RS-232C connection is available.

RS-232C CONNECTION

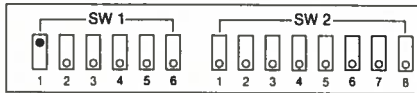
● Cable

A standard RS-232C is supplied with the Apple IIc. Here is the wiring diagram of the cable.

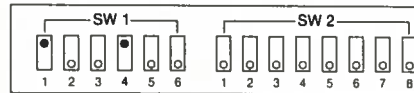


● DIP Switch Settings (9600 bps, 8 bit, No Parity)

Normal



With ASCII Wheel (sold separately)



Important:

Be sure the DIP switch 1-3 is ON (down).

● Defining the Output Port as Printer Port

Use the commands:

] PR #1 to start printing through IF-60.

] PR #0 to stop printing through IF-60.

TI 99/4A

Appendix A

A PHP-1200 extension system is provided for the TI 99/4A. This extension makes RS-232C connection possible.

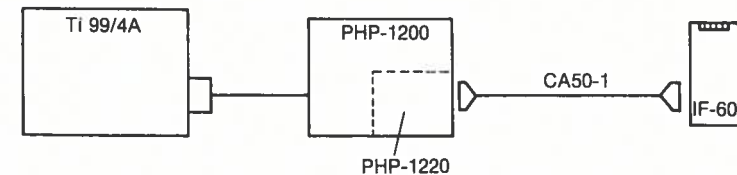
RS-232C CONNECTION

● Cable and Interface

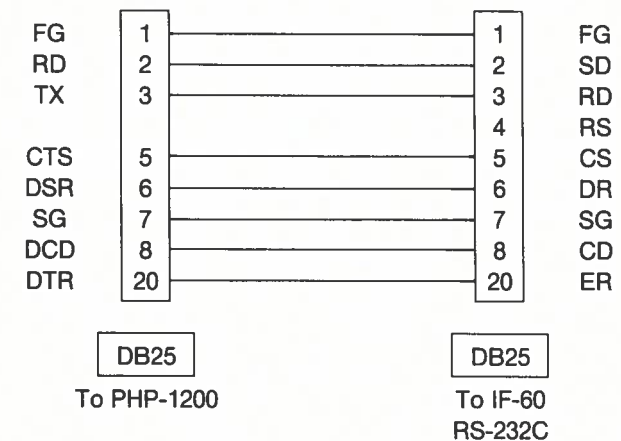
Use a

PHP-1220 RS-232C interface card
and a
BROTHER CA50-2 cable

according to the following diagram.

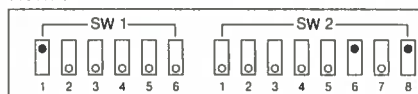


Here is the wiring diagram of the CA50-2.



● DIP Switch Settings (300 bps, 8 bit, No Parity)

Normal



With ASCII Wheel (sold separately)



RS-232C CONNECTION

● Cable and Interface

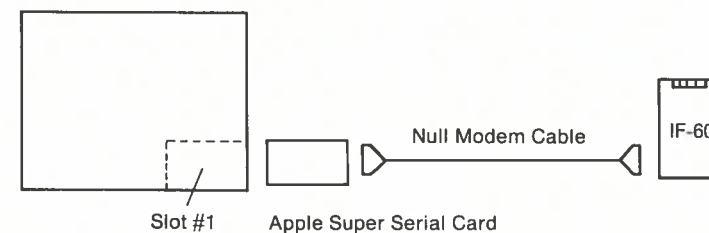
Insert an

APPLE SUPER SERIAL Card
or
CCS 7710

into the computer's slot #1.

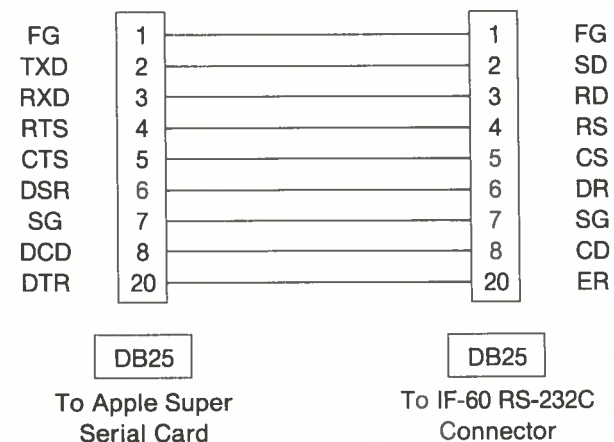
Then connect the card to the IF-60 by using a

NULL MODEM Cable

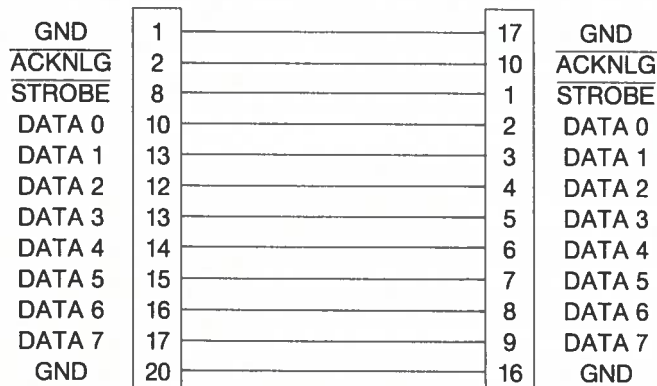


★ Jumper block on the Super Serial Card should be set to Printer Mode.

Here is the wiring diagram of the NULL MODEM Cable.



Here is the wiring diagram of the Apple Parallel Cable.



DB25

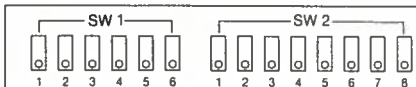
To Apple II, IIe

AMPHENOL 36P

To IF-60 CDCC

● DIP Switch Settings

Normal



With ASCII Wheel (sold separately)



Important:

Be sure the DIP Switch 1-3 is ON (down).

● Defining the Output Port as Printer Port

Use the commands:

] PR #1 ☐ to start printing through IF-60.

] PR #0 ☐ to stop printing through IF-60.

TRS-80 Model III (TANDY)

Appendix A

A standard interface is provided for the TRS-80. This interface makes CDCC connection possible.

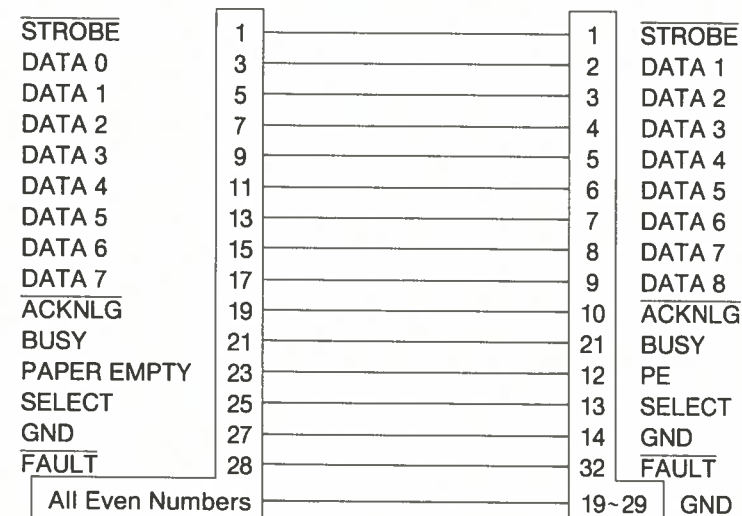
CDCC CONNECTION

● Cable

Use a

BROTHER CA50-7 Cable

Here is the wiring diagram of the CA50-7.

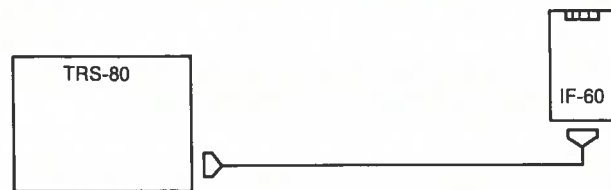


EDGE TYPE 36P

To TRS80

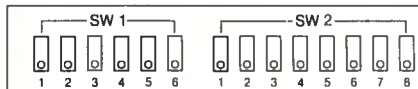
AMPHENOL 36P

To IF-60
CDCC



● DIP Switch Settings

Normal



With ASCII Wheel (sold separately)



APPLE II, IIe

Appendix A

You may choose either CDCC or RS-232C connection.

CDCC CONNECTION

● Cable and Interface

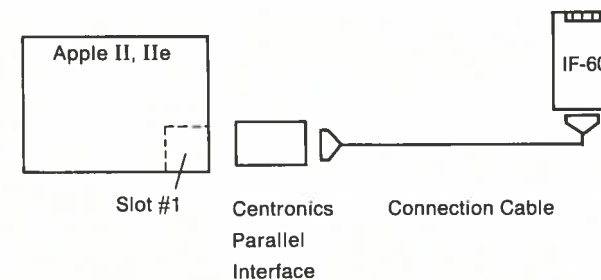
Insert a Centronics parallel Interface such as

APPLE PARALLEL INTERFACE CARD
or
GRAPPLER +
or
EPSON APL TYPE I, II

into the computer's slot #1.

A standard cable was supplied with the interface card. However, this cable is not supplied anymore with recent APPLE computers. The cable you need is an

APPLE PARALLEL CABLE



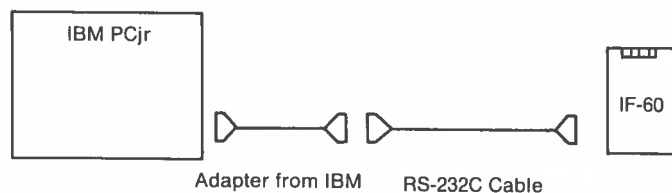
RS-232C CONNECTION

● Cable

The RS-232C compatible connector of the PCjr is a BERG16 connector so that you will need a

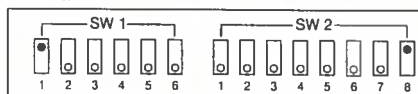
Cable Adapter (From IBM)

Connection is made by using this Adapter and an RS-232C cable (See IBM PC page 20).



● DIP Switch Settings (4800 bps, 8 bit, No Parity)

Normal



With ASCII Wheel (sold separately)



★ You can set the baud rate up to 4800 bps.

● Defining the RS-232C Port as Printer Port

Use the following DOS commands:

A > MODE COM1: 4800, N, 8, 1, P [↵]

A > MODE LPT1: = COM1: [↵]

SINCLAIR-QL

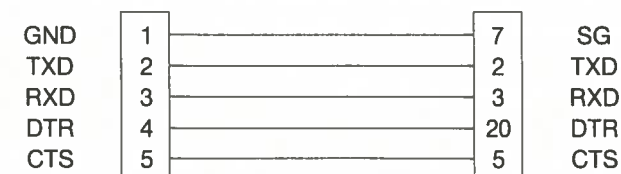
Appendix A

A standard RS-232C interface is provided for the Sinclair-QL. Two channels (Serial 1, Serial 2) are available. With the IF-60, use Serial 1 only.

RS-232C CONNECTION

● Cable

Here is the wiring diagram of the cable.



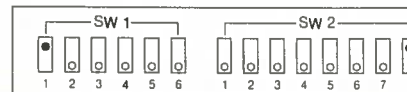
DB25

To QL

To IF-60 RS-232C

● DIP Switch Settings (4800 bps, 8 bit, No Parity)

Normal



With ASCII Wheel (sold separately)



Important:

The 9600 bps speed available on the Sinclair-QL is too high for the 1 stop bit feature. The transmission speed has to be set to 4800 bps.

BBC MICRO COMPUTER

Appendix A

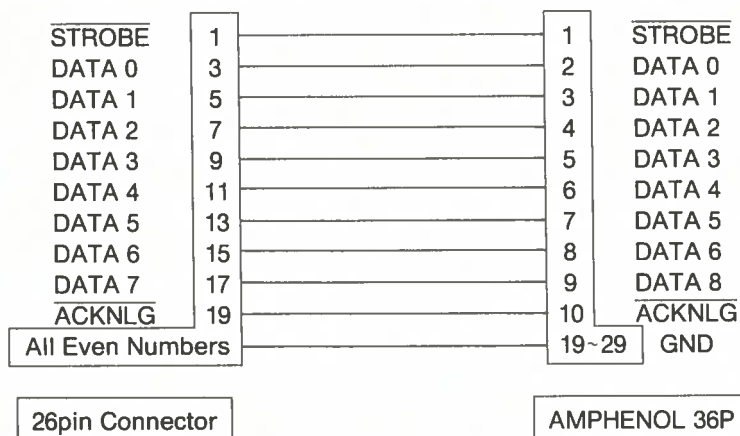
You may choose either CDCC or RS-232C connection.

CDCC CONNECTION

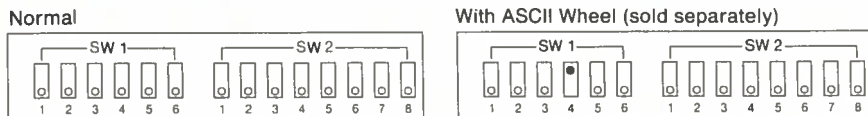
● Cable

The BBC MICRO COMPUTER is equipped with a standard CDCC interface. The ANG 04 supplied with the BBC can be used.

Here is the wiring diagram of the ANG 04.



● DIP Switch Settings



IBM PCjr

Appendix A

You may choose either CDCC or RS-232C connection.

CDCC CONNECTION

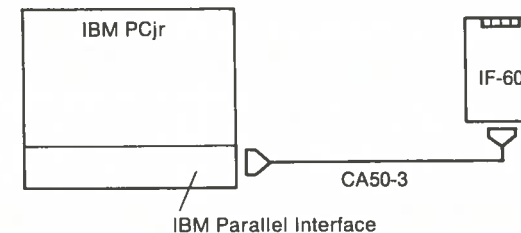
● Cable and Interface

Two cables are available:

BROTHER CA50-3
or
IBM Parallel Printer Cable

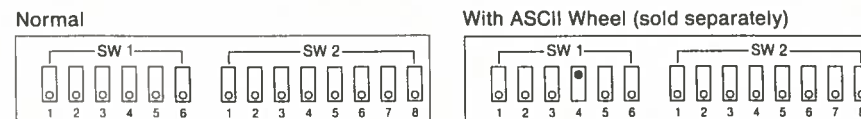
In addition, you will need an

IBM Parallel Printer Interface Card



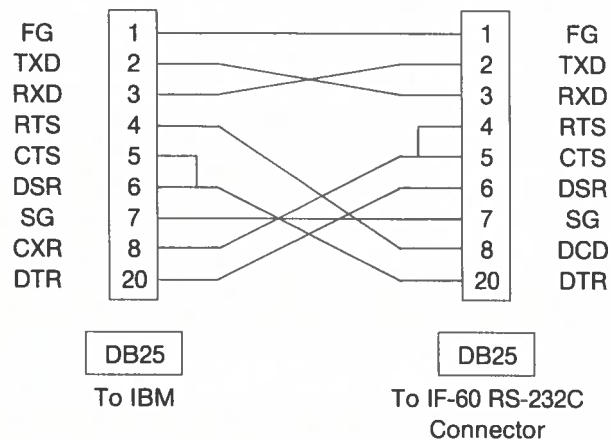
The wiring diagram of the CA50-3 cable is given on page 18.

● DIP Switch Settings

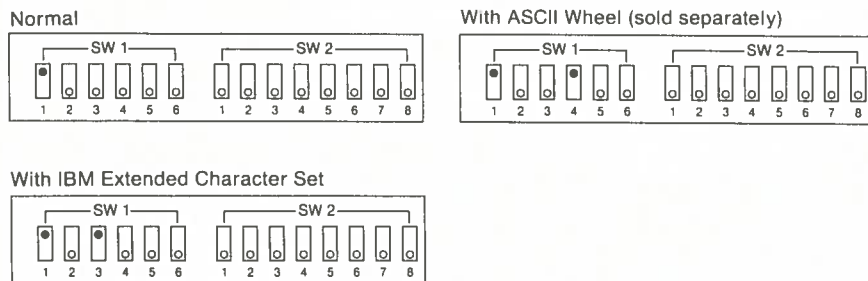


★ The IBM Extended Character Set can not be used on PCjr.

Here is the wiring diagram of the RS-232C cable.



● DIP Switch Setting (9600 bps, 8 bit, No Parity)



● Defining the RS-232C Port as Printer Port

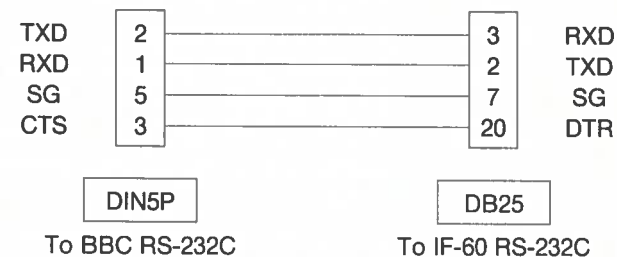
Use the following DOS commands:

A > MODE COM1: 9600, N, 8, 1, P ☐
A > MODE LPT1: = COM1: ☐

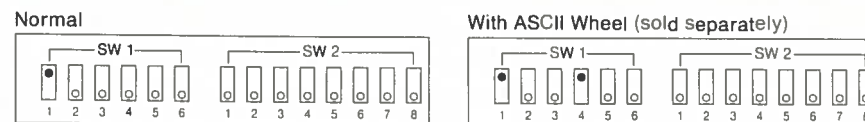
RS-232C CONNECTION

● Cable

The BBC MICRO COMPUTER is equipped with a standard RS-232C interface. Prepare a cable according to the following wiring diagram.



● DIP Switch Settings (9600 bps, 8 bit, No Parity)



DIP Switch Function

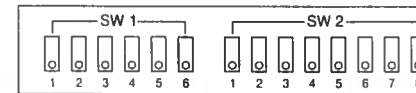
Appendix B

The following table explains the function of the DIP Switch settings.

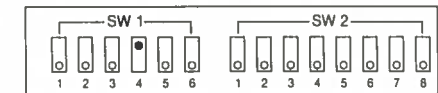
Switch No.	Setting	Function
1-1	UP DOWN	RS-232C interface selection CDCC interface selection
1-2	UP DOWN	Terminal mode selection (electronic mail via telephone) Printer mode selection (selects Diablo compatible printer mode connection with a PC)
1-3	UP DOWN	* Users in the USA can ignore this setting.
1-4	UP DOWN	ASCII Wheel selection (convenient if an ASCII Wheel is used in printer or terminal mode) * When this switch is UP, the typewriter switch selection for a given country is ignored When a non-ASCII Wheel is used (convenient if a wheel other than the ASCII wheel is used) * When this switch is DOWN, the typewriter switch selection for a given country is taken into account
1-5	UP DOWN	When 12-inch long paper is used When 11-inch long paper is used
1-6	UP DOWN	Auto skip perforation mode (skips continuous paper perforations) Non auto skip perforation mode (ignores continuous paper perforations)

● DIP Switch Setting (9600 bps, 8 bit, No Parity)

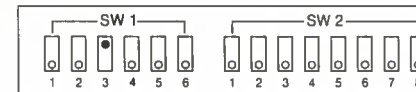
Normal



With ASCII Wheel (sold separately)



With IBM Extended Character Set

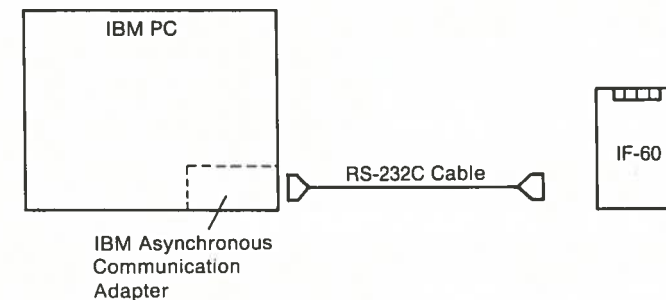


RS-232C CONNECTION

● Cable and Interface

You need an

IBM Asynchronous Communication Adapter
and
RS-232C Cable



IBM-PC and Compatibles

Appendix A

You may choose either CDCC or RS-232C Connection.

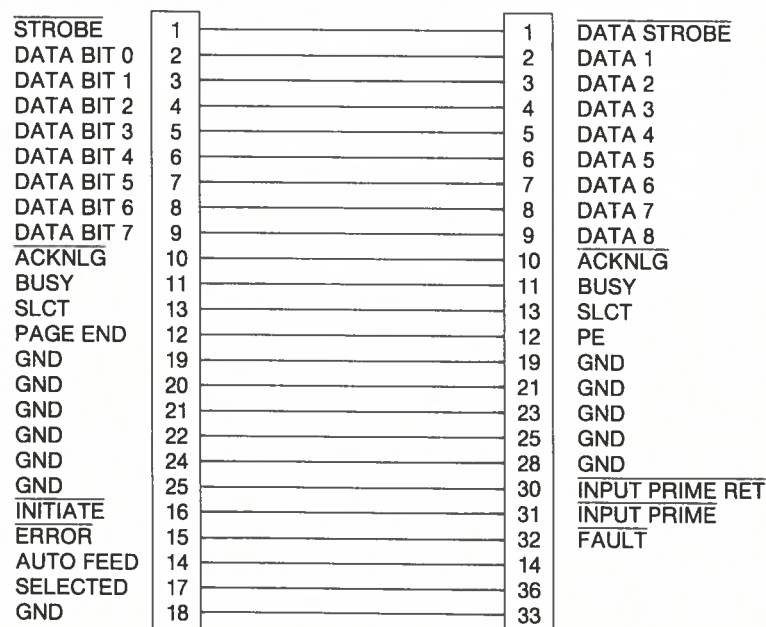
CDCC CONNECTION

• Cable

Two cables are available:

BROTHER CA50-3
or
IBM Parallel Printer Cable

Here is the wiring diagram of the CA50-3.



DB25

36 PIN Connector

To IBM Centronics
Parallel connector

To IF-60 CDCC
Connector

Switch No.	Setting	Function
2-1	UP	Local echo (for terminal mode: used with half-duplex mode)
	DOWN	No local echo (for terminal mode: used with full-duplex mode)
2-2	UP	DC-1/DC-3 control disabled
	DOWN	DC-1/DC-3 control enabled
2-3	UP	Auto line feed (necessary if printer line feed is not performed)
	DOWN	No auto line feed (necessary for double spacing)
2-4	UP	Selects 7-bit data length in RS-232C mode (length of data transmission protocol)
	DOWN	Selects 8-bit data length in RS-232C mode
2-5	UP	Even parity
	DOWN	Odd parity ★ This switch specifies check bit of transferred data if switch 2-4 is UP.
2-6		Select the baud rate (transmission speed) ★ See table below
2-7		
2-8		

Baud rate	2-6	2-7	2-8
9600	DOWN	DOWN	DOWN
4800	DOWN	DOWN	UP
2400	DOWN	UP	DOWN
1200	DOWN	UP	UP
600	UP	DOWN	DOWN
300	UP	DOWN	UP
150	UP	UP	DOWN
110	UP	UP	UP

ASCII Codes and International Character Set

Appendix C

This appendix provides the ASCII code in a table format. A conversion table is included for the ASCII characters in binary, hexadecimal, and decimal notation.

b ₈ ---	0	0	0	0	0	0	0
b ₇ ---	0	0	0	0	1	1	1
b ₆ ---	0	0	1	1	0	0	1
b ₅ ---	0	1	0	1	0	1	1
b ₄ b ₃ b ₂ b ₁	0	1	2	3	4	5	6
0 0 0 0	0	NUL	SP	0	@	P	` p
0 0 0 1	1	DC 1	!	1	A	Q	a q
0 0 1 0	2		"	2	B	R	b r
0 0 1 1	3	DC 3	#	3	C	S	c s
0 1 0 0	4		\$	4	D	T	d t
0 1 0 1	5		%	5	E	U	e u
0 1 1 0	6		&	6	F	V	f v
0 1 1 1	7	BEL	'	7	G	W	g w
1 0 0 0	8	BS CAN	(	8	H	X	h x
1 0 0 1	9	HT	)	9	I	Y	i y
1 0 1 0	A	LF	*	:	J	Z	j z
1 0 1 1	B	VT ESC	+	;	K	[	k {
1 1 0 0	C	FF	,	<	L	\	l |
1 1 0 1	D	CR	-	=	M	]	m }
1 1 1 0	E	RS	.	>	N	^	n ~
1 1 1 1	F	US	/	?	O	_	o DEL

ASCII 7-bit Code Table

Note:

In the ASCII code conversion tables that follow, control characters with an asterisk (*) at the right are not applicable to Daisywheel Typewriter.

APPENDIX

- A — Connection & Wiring Diagrams 18
- B — DIP Switch Function 42
- C — ASCII Codes and International Character Set..... 44
- D — Control Codes (corresponding to ASCII Codes) and their Functions..... 47
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- H — Alphabetical Index..... 63

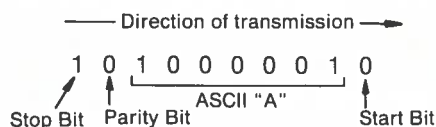
The receiving system set to even parity sums up the total number of "1"s in a received byte. Sometimes, due to noises on the transmission line, a bit is not correctly transmitted. When this occurs, the total number of "1"s is likely to be odd. Depending on its communication software, the receiving computer will either ignore such a byte or request a retransmission.

Parity check works in a similar way with odd parity setting. The eighth bit can also be used to transmit information just like the other 7 bits. In such a case, parity check is impossible (parity must be set to None) but a single byte can transfer codes from 0 to 255, allowing for extended character sets.

The amount of bits that are actually used to transfer a character is called a word: 7-bit words allow for transmission of 128 different characters with parity check; 8-bit words allow for transmission of 256 different characters without parity check.

● Transmission Speed

Transmission speed is expressed in bits per second (bps). Therefore, a transmission speed of 1200 bps might be said to correspond to $1200/8 = 150$ characters per second. This is not actually true. In fact, the receiving system must be able to detect the starting point of each byte in a sequence of electric pulses. To achieve this, a zero bit (start bit) is added at the beginning of each byte — and a 1 bit (stop bit) at its end. A single character will therefore use a total of 10 bits:



A transmission speed of 1200 bps then corresponds to 120 characters per second.

Note:

The transmission speed is commonly referred to as Baud rate. Although Baud rate and bps are slightly different concepts, we shall consider here they are equivalent.

Binary	Hex	Dec	Character
0000000	00	0	NUL
0000001	01	1	SOH *
0000010	02	2	STX *
0000011	03	3	ETX *
0000100	04	4	EOT *
0000101	05	5	ENQ *
0000110	06	6	ACK *
0000111	07	7	BEL
0001000	08	8	BS
0001001	09	9	HT
0001010	0A	10	LF
0001011	0B	11	VT
0001100	0C	12	FF
0001101	0D	13	CR
0001110	0E	14	SO *
0001111	0F	15	SI *
0010000	10	16	DLE *
0010001	11	17	DC1
0010010	12	18	DC2 *
0010011	13	19	DC3
0010100	14	20	DC4 *
0010101	15	21	NAK *
0010110	16	22	SYN *
0010111	17	23	ETB *
0011000	18	24	CAN
0011001	19	25	EM *
0011010	1A	26	SUB *
0011011	1B	27	ESC
0011100	1C	28	FS *
0011101	1D	29	GS *
0011110	1E	30	RS
0011111	1F	31	US
0100000	20	32	SP
0100001	21	33	!
0100010	22	34	"
0100011	23	35	#
0100100	24	36	\$

Binary	Hex	Dec	Character
0100101	25	37	%
0100110	26	38	&
0100111	27	39	'
0101000	28	40	(
0101001	29	41)
0101010	2A	42	*
0101011	2B	43	+
0101100	2C	44	,
0101101	2D	45	-
0101110	2E	46	.
0101111	2F	47	/
0110000	30	48	0
0110001	31	49	1
0110010	32	50	2
0110011	33	51	3
0110100	34	52	4
0110101	35	53	5
0110110	36	54	6
0110111	37	55	7
0111000	38	56	8
0111001	39	57	9
0111010	3A	58	:
0111011	3B	59	;
0111100	3C	60	<
0111101	3D	61	=
0111110	3E	62	>
0111111	3F	63	?
1000000	40	64	@
1000001	41	65	A
1000010	42	66	B
1000011	43	67	C
1000100	44	68	D
1000101	45	69	E
1000110	46	70	F
1000111	47	71	G
1001000	48	72	H
1001001	49	73	I
1001010	4A	74	J

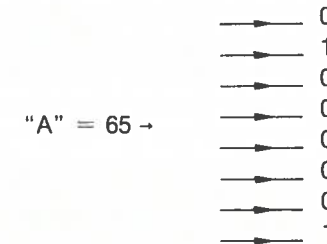
Binary	Hex	Dec	Character
1001011	4B	75	K
1001100	4C	76	L
1001101	4D	77	M
1001110	4E	78	N
1001111	4F	79	O
1010000	50	80	P
1010001	51	81	Q
1010010	52	82	R
1010011	53	83	S
1010100	54	84	T
1010101	55	85	U
1010110	56	86	V
1010111	57	87	W
1011000	58	88	X
1011001	59	89	Y
1011010	5A	90	Z
1011011	5B	91	[
1011100	5C	92	\
1011101	5D	93]
1011110	5E	94	^
1011111	5F	95	_
1100000	60	96	`
1100001	61	97	a
1100010	62	98	b
1100011	63	99	c
1100100	64	100	d
1100101	65	101	e
1100110	66	102	f
1100111	67	103	g
1101000	68	104	h
1101001	69	105	i
1101010	6A	106	j
1101011	6B	107	k
1101100	6C	108	l
1101101	6D	109	m
1101110	6E	110	n
1101111	6F	111	o
1110000	70	112	p
1110001	71	113	q

Binary	Hex	Dec	Character
1110010	72	114	r
1110011	73	115	s
1110100	74	116	t
1110101	75	117	u
1110110	76	118	v
1110111	77	119	w
1111000	78	120	x
1111001	79	121	y
1111010	7A	122	z
1111011	7B	123	{
1111100	7C	124	|
1111101	7D	125	}
1111110	7E	126	~
1111111	7F	127	DEL

Computers, however, store information into blocks of memory called bytes, made of 8 bits, thus allowing for the binary representation of numbers from 0 to 255. We shall see later how the eighth bit is used in transmission.

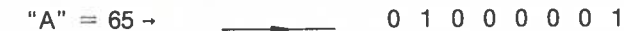
Two ways of transmission may be considered:

- (1) Parallel transmission: each bit belonging to a byte is transmitted through individual wires.



This is actually the way data are transmitted through CDCC connectors.

- (2) Serial transmission: each bits of a byte are transmitted in sequence through a single wire.



This is actually the way data are transmitted through RS-232C connectors — and the only way you may use to transmit data through a single-wire telephone line.

● Parity/Extended Characters

The eighth bit of a byte, referred to as parity bit, allows the receiving system to check the contents of the other 7 bits. Parity setting refers to the way this check will be carried out. Three options exist:

- (1) Even Parity
- (2) Odd Parity
- (3) None

The parity setting of the transmitting and receiving system must be equal. Suppose both systems are set to even parity. This means that every transmitted byte is supposed to have an even number of "1". 65 contains two "1"s and will be transmitted without modification. 67 ("C"), however, contains three "1"s (01000011). The eighth bit is therefore replaced by "1" so that the total number of "1"s is even.

8. Introduction to Data Transmission

• ASCII Code

Pressing a key on your computer keyboard automatically generates a numeric value which in turn is used by the computer to select the character to be displayed on the screen. When such a numeric value is sent to a daisy wheel printer, it serves to position the wheel so that the correct character can be printed.

The way a character is associated with a numeric value has been standardized and is referred to as ASCII Code (for American Standard Code for Information Interchange). Beside the printable characters (lower case and upper case alphabets, numbers, operation and punctuation symbols), ASCII Code also includes special codes that control the flow of information. These are not printed, but rather correspond to controls such as carriage return, line feed, backspace, etc.

Here is a list of the standard ASCII characters:

Control codes	32	"characters"
Alphabetic characters	26	lower case characters
	26	upper case characters
Numbers (0 ~ 9)	10	characters
Punctuation, arithmetical symbols, space	33	characters
Delete key	1	"character"
	128	

A more detailed list is given in appendix C.

The 128 characters listed above can be represented by numbers from 0 to 127.

• Data Transmission

Data can be transmitted through cables if they are first converted into electric signals. In a computer, numbers are represented in binary notation using only 0 and 1. The "A" character whose ASCII code is 65 is "written" as 01000001 in the computer's memory. This code becomes a sequence of electric pulses when transmitted: "0" is a positive pulse and "1" a negative pulse. Each pulse is called a bit. Note that numbers from 0 to 127 can be represented in binary notation using 7 bits only: zero is represented by 0000000 and 127 by 1111111.

Control Codes (Corresponding to ASCII Codes) and their Functions

Appendix D

• Standard Control Codes

Symbol	Code	Function	CX	AX
BEL (Bell)	07 H	Acoustic alarm sounds about 2 sec.	○	○
BS (Back Space)	08 H	Moves the carriage backward one character.	○	○
LF (Line Feed)	0A H	Feeds the form one line after one line of data is printed from the buffer. The subsequent data is over-printed in the same position as the carriage does not return to the left margin.	○	○
FF (Form Feed)	0C H	After one line of data is printed from the buffer, the form is fed the number of lines designated by an ESC sequence minus the number of lines already fed on that page. (If the top margin is set, the form will be fed to the top margin.) The carriage does not return to the left margin.	○	○
CR (Carriage Return)	0D H	1) Prints one line of data from the buffer. 2) Then, feeds the form one line if so set by DIP switch or ESC". (This is effective even when CR alone is entered as CR is always followed by LF.) 3) Carriage return is effective even if print data is not received before the CR code.	○	○
DC1 (Device Control 1)	11 H	Puts IF-60 in Select state.	○	○
DC3 (Device Control 3)	13 H	Puts IF-60 in Deselect state.	○	○
VT (Vertical Tabulation)	0B H	After printing data up to VT, this command feeds paper to the next VT position. Does not operate if the next VT position is not set. (Does not return to left margin.)	○	
HT (Horizontal Tabulation)	09 H	Carriage moves to the next HT position. Does not operate if the next HT position is not set.	○	○
ESC (Escape)	1B H	Extension code which, combined with the following code, makes control code.	○	○

○ → Ok

● ESC (escape) Codes

Note 1:

While auto backward printing is set, inputting any of the ESC sequences marked with a dagger (†) at the left of the table causes a carriage return (CR) which moves the carriage to the left margin and resets forward printing.

	Symbol	Function	CX	AX
†	ESC + HT + n	Absolute HT movement	○	○
†	ESC + LF	Reverse paper feed	○	
†	ESC + VT + n	Absolute VT movement	○	
†	ESC + FF + n	Set page length; ESC S resets to default setting	○	○
†	ESC + CR + P	Reset printer	○	○
†	ESC + RS + n	Set VMI; ESC S resets to 1/6 inch	○	
†	ESC + US + n	Set HMI; ESC S resets to PITCH default setting	○	○
	ESC + "	Auto LF "ON"	○	○
	ESC + #	Auto LF "OFF"	○	○
†	ESC + &	Clear bold, shadow, double print	○	○
	ESC + —	Set VT at current position	○	
	ESC + /	Set auto backward print	○	
	ESC + 0	Set right margin at current position	○	○
	ESC + 1	Set HT at current position	○	○
	ESC + 2	Clear all HT, VT clear	○	○
	ESC + 8	Clear current position HT	○	○
	ESC + 9	Set left margin at current position	○	○
	ESC + C	Clear top margin, bottom margin clear	○	
†	ESC + D	Feed form by reverse 1/12 inch	○	
†	ESC + E	Set auto underline	○	○
†	ESC + F	Set double-strike print mode	○	
	ESC + L	Set bottom margin at current position	○	
†	ESC + O	Set bold print set	○	
†	ESC + R	Clear auto underline	○	○
†	ESC + S	Reset to switch panel, DIP switch	○	○
	ESC + T	Set top margin at current position	○	
†	ESC + U	Feed form by 1/12 inch	○	
†	ESC + W	Set shadow print	○	
†	ESC + X	Clear underline, auto strike-out, shadow, and double-strike print	○	○
	ESC + Y	Print 20H character	○	○
	ESC + Z	Print 7FH character	○	○
†	ESC + \	Clear auto backward print	○	

○ → Ok

● Hayes Smart Modem

- (1) Turn ON the typewriter and the Modem.
- (2) Press the **SEL** switch to get the IF-60 on-line.
- (3) Type in
AT DT <telephone number> **Return**
- (4) The Modem prints a "Connect" message.
- (5) Communication is now possible. Press the typewriter **Return** key once or twice to let the other party know you are ready.

● Troubleshooting

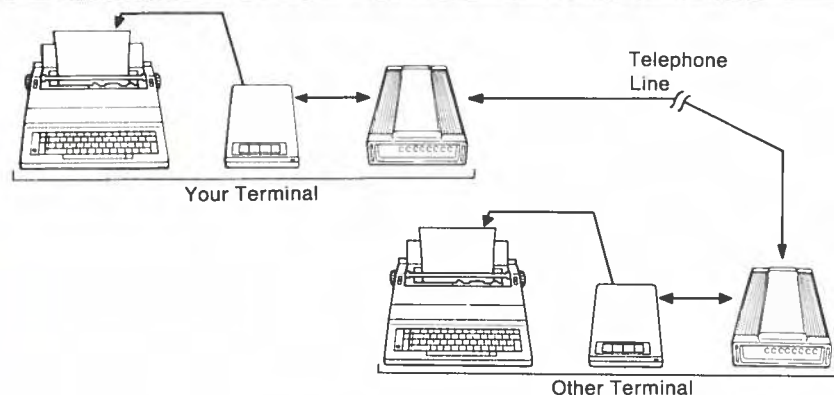
When something goes wrong, refer to the following table to find the cause of errors and to correct it.

Trouble	Possible Cause(s)	Remedy
Printout impossible	<ul style="list-style-type: none"> ● IF-60 is not ON-LINE ● CDCC CONNECTION is selected 	Press the SEL switch Set 1-1 switch to OFF (up)
Strange Characters are printed	<ul style="list-style-type: none"> ● 8-bit code is selected ● Improper Baud rate, parity ● Improper cable ● Incorrect cable wiring 	Set 1-3 switch to ON (down) Check switches from 2-5 to 2-8 Consult your dealer See Appendix A — NULL MODEM
Overlapping characters	<ul style="list-style-type: none"> ● Incorrect local echo 	Set switch 2-1 to ON (down)
Typed characters are illegible	<ul style="list-style-type: none"> ● No host computer echo 	Set switch 2-1 to OFF (up)
Incorrect printout of long texts	<ul style="list-style-type: none"> ● Incorrect cable wiring 	See Appendix A — NULL MODEM
Abnormal operation when SEL switch is pressed during printing	<ul style="list-style-type: none"> ● Incorrect cable wiring 	See Appendix A — NULL MODEM

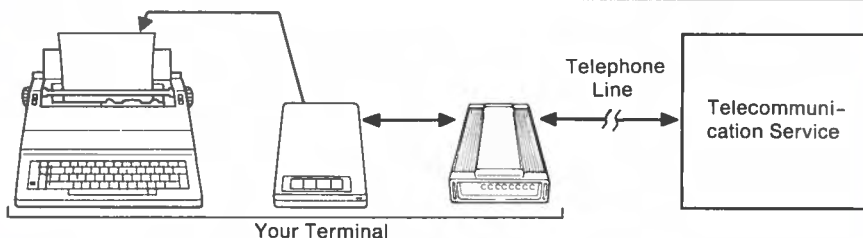
7. Operation in Terminal Mode

The following diagrams show how your typewriter and your IF-60 can be used for personal data communication, electronic mail, or for accessing data banks.

PERSONAL DATA COMMUNICATION



ACCESS TO ELECTRONIC MAIL & DATA BANKS



The operation depends on the kind of Modem you own:

● Manual Modem

- (1) Turn ON the typewriter and the Modem.
- (2) Press the **SEL** switch to get the IF-60 on-line.
- (3) Make a telephone call to confirm your correspondent's readiness.
- (4) Press the Modem ON-LINE Switch and put the telephone down.
- (5) Communication is now possible. Press the typewriter **Return** key once or twice to let the other party know you are ready.

Note 2:

The above table explains availability of control codes with CX and AX series. The names of model which belong to CX or AX series are listed below.

CX series:	PROFESSIONAL 90
	Professional 400
	PROFESSIONAL 80
	Professional 440
	EM-401
	EM-411
AX series:	COMPACTRONIC 350
	EM-31

Note 3:

Bidirectional printing is available only when in Printer mode and with CX series.

CAUTION:

1. When the typewriter is engaged in printing, be sure to observe the following points:
 - do not open the top cover as this may cause data to be omitted.
 - do not operate the typewriter keys as this too might result in an omission of data.
 - do not make a selection of the keyboard selector with the top cover open as this can create a faulty selection of the code table.
2. Do not press the SELECT switch when the typewriter is in the printing operation.
3. For the line-feed operation, always use the LF key of the IF-60 after turning the SEL LED off.

● ESC Sequence Functions

Print Format

(1) Setting Character Pitch (HMI)

ESC + US + n sets character pitch.

ESC + S resets HMI to the pitch specified by **[PITCH]** select key.

$HMI = (n - 1) \times 1/120$

The n specifies 13, 11 and 9.

After HMI is set, carriage moves in the amount of HMI in each print or space.

ESC + S resets HMI to the pitch specified by **[PITCH]** select key.

(2) Setting Line Pitch (VMI)

ESC + RS + n sets line pitch.

ESC + S resets VMI to 1/6 inch.

$VMI = (n - 1) \times 1/48$

The n specifies 9, 13, 17 and 25.

ESC + S resets VMI to the pitch specified by **[LINE]** space select key.

(3) Setting Page Length

ESC + FF + n sets page length.

ESC + S resets page length to DIP SW.

Page length = n x VMI

The n specifies 1 ~ 126 excepting NUL and DEL codes and the typewriter interprets the existing VMI as one line. The page length is stored in memory as the absolute position measured with reference to the top of the page. Therefore, if you change the VMI, the number of lines per page also changes.

ESC + S resets page length to DIP SW.

(4) Setting Left Margin

ESC + 9 sets left margin.

The code sets left margin at present position.

Absolute HT movement or BS enables carriage to move further to the left than the left margin position. (New left margin can be set)

In case the setting position is larger than right margin or the distance between right and left margins is less than 24/120 inch, the new margin cannot be set.

(5) Setting Right Margin

ESC + 0 sets right margin.

The code sets right margin at present position.

Absolute HT movement enables carriage to move further to the right than the right margin position. (New right margin can be set)

In case the setting position is smaller than left margin or the distance between right and left margins is less than 24/120 inch, the new margin cannot be set.

● Troubleshooting

When something goes wrong, refer to the following tables to find the cause of errors and to correct it.

CDCC CONNECTION

Trouble	Possible Cause(s)	Remedy
Printout impossible	<ul style="list-style-type: none"> ● IF-60 is not ON LINE ● RS-232C CONNECTION is selected 	Press the [SEL] switch Set 1-1 switch to ON (down)
Strange characters are printed	<ul style="list-style-type: none"> ● Incorrect software installation ● 8-bit code table is set ● Improper connection cable 	Read the software manual again and properly install the software Set 1-3 switch to ON (down) Consult your Brother dealer
Unwanted double spacing	<ul style="list-style-type: none"> ● Auto Line Feed is set 	Set 2-3 switch to ON (down)
No spacing	<ul style="list-style-type: none"> ● Auto Line Feed is required 	Set 2-3 switch to OFF (up)

RS-232C CONNECTION

Trouble	Possible Cause(s)	Remedy
Printout impossible	<ul style="list-style-type: none"> ● IF-60 is not ON LINE ● CDCC CONNECTION is selected 	Press the [SEL] switch Set 1-1 switch to OFF (up)
Strange characters are printed	<ul style="list-style-type: none"> ● Incorrect software installation ● 8-bit code table is set ● Baud rate, parity incorrectly set ● Improper connection cable wiring 	Read the software manual again and properly install the software Set 1-3 switch to ON (down) Check switches from 2-5 to 2-8 Consult your Brother dealer or re-check your wiring
Incorrect printout of long text	<ul style="list-style-type: none"> ● Incorrect connection cable wiring 	Consult your Brother dealer or re-check your wiring
Abnormal operation when the [SEL] switch is pressed during printing	<ul style="list-style-type: none"> ● Improper connection cable wiring 	Consult your Brother dealer or re-check your wiring

6. Operation in Printer Mode

● Using a Word Processor

The easiest way to confirm that your system is working properly consists in trying to print a text created by means of your word processor software.

Load your word processor software, input a text from the computer keyboard—or load an already existing document.

Now try to print the text, just using the same way as if a common printer were connected to your computer. Select a TTY printer if the print result is not satisfactory.

Important:

Your typewriter may not be able to detect the end of a page. This can be the source of trouble when you want to print a long document on separate sheets of paper.

Fortunately, many word processors allow for a pause between pages. In that case, carefully format the size of each page. Printout will stop at the end of each print page. Feed paper and re-start the printout.

● Using BASIC Programs

If you are running your own BASIC programs, you may want to list them or to print some results generated by your programs.

Refer to your Computer's Manuals for program listings.

The following example (for an IBM PC) shows how to print a text both on the screen and on paper at the rate you type it (CDCC Connection):

```
10 K$ = INKEY$: IF K$ = "" THEN 10
20 PRINT K$; : LPRINT K$;
30 GOTO 10
```

Control Characters listed in Appendix D allow for controlling the printout format to some extent. Other kinds of commands are available for more precise control of the printout format. These commands—referred to as ESCAPE sequences—start with the ESC character (ASCII 27) followed by other ASCII Code(s). Such sequences of characters are not printed, even if the ASCII Code(s) following ESC correspond to printable characters. A complete list of ESCAPE sequences is given in Appendix D.

(6) Setting HT

ESC + 1 sets HT position.

ESC + 8 clears present position.

ESC + 2 clears whole HT positions.

HT position is set at present position and can be set up to 10 places.

To clear present HT position only, input ESC + 8; to clear whole HT positions, input ESC + 2, which also clears whole VT positions.

(7) Setting VT

ESC + — sets VT position.

ESC + 2 clears whole VT positions.

VT position is set at present position and can be set in 10 places. Present VT position alone cannot be cleared.

ESC + 2 clears not only whole VT positions but also all HT positions.

(8) Setting Top Margin

ESC + T sets top margin.

ESC + C, Page Length Setting, or Remote Resetting clears top margin.

Top margin is set at present position.

Paper is automatically fed in the amount of top margin, when it reaches page top by LF.

VT, absolute VT movement, or reverse LF enables paper feed within top margin. (New top margin can be set)

Top margin can be cleared by changing page length, or by remote resetting or ESC + C, however, when skip perforation is set, top margin returns to 1-inch margin.

In case the position falls within bottom margin, the new margin cannot be set.

(9) Setting Bottom Margin

ESC + L sets bottom margin.

ESC + C, Page Length Setting, or Remote Resetting clears bottom margin.

Bottom margin is set at present position.

Paper is automatically fed to the following page top, when it reaches bottom margin by LF, Auto LF or Half LF.

VT or absolute VT movement enables paper feed within bottom margin.

Bottom margin can be cleared by changing page length, or by remote resetting or ESC + C; however, when skip perforation is set, bottom margin returns to 1-inch margin.

In case the setting position falls within top margin, the new margin cannot be set.

(10) Absolute HT Movement

ESC + HT + n sets absolute HT movement.

Movement range = (n - 1) x HMI

The n specifies 1 ~ 126 excepting NUL and DEL codes and the range can be set in present HMI/120-inch increments.

This function makes carriage move directly from left end of platen to set position, but is not stored as HT. (Margins are ignored.)

Does not operate when set position goes beyond right end of platen.

(11) Absolute VT Movement

ESC + VT + n sets absolute VT movement.

Movement range = $(n - 1) \times \text{VMI}$

The n specifies 1 ~ 126 excepting NUL and DEL codes and the range can be set in present VMI/48-inch increments.

This function feeds paper directly from page top to set position, but is not stored as VT.

This can move within top and bottom margins (margins are ignored). In case the setting position goes beyond page length, it does not operate.

(12) Reverse LF

ESC + LF sets reverse LF.

Feeds paper in reverse direction in the amount of present VMI.

(13) Half LF

ESC + U sets half LF.

Feeds paper by 1/12 inch.

(14) Reverse half LF

ESC + D sets reverse half LF.

The paper is fed reversely by 1/12 inch.

(15) Auto Backward Print

ESC + / sets auto backward print.

ESC + \ clears auto backward print.

When this mode is set, the typewriter executes logic seeking. However, if the ESC sequences marked with a dagger in the table on page 48 are input, carrier moves to left margin by CR code and the typewriter starts forward print.

In Printer Mode, Auto Backward Print is the default.

(16) Auto LF

ESC + " sets auto LF.

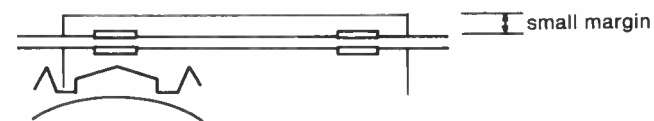
ESC + # clears auto LF.

When CR code is input with auto LF in set, the typewriter automatically engages LF.

● Preparing the IF-60 Unit and the Typewriter

- (1) Refer to the instruction Manual of your Brother Typewriter in order to properly set the typewriter and feed paper (only cut paper can be used).
- (2) The IF-60 is ready to transmit when the SEL LED is lit. To turn this LED on, press the **[SEL]** Switch once.

How to feed a paper sheet



Insert the paper sheet and turn the platen knob to adjust the paper position. When the **[SEL]** switch is pressed, the IF-60 will assume this set position is the beginning of the page. Therefore, to be sure an entire page can be printed on your sheet, set the initial position of the paper with a small upper margin.

Note:

The IF-60 knows in which line of a page printing is carried out. This is true even when you operate the **[LF]** and **[FF]** switch of the IF-60. However, a manual line feed (from the typewriter platen knob) can not be detected. If you use the **[LF]** switch to feed lines, and then the platen knob to move the paper back, printing will be inconsistent. Therefore, NEVER use the typewriter platen knob to move the paper.

More detailed operation instructions are provided in the next sections.

- For Printer Mode operation, see section 6.
- For Terminal Mode operation, see section 7.
- To know more about data transmission, see section 8.

5. How to Start

We assume here that your system is properly connected and that you correctly carried out the principal DIP Switch settings. These settings tell the following to the IF-60:

- SW1-1 RS-232C or CDCC connection
- SW1-2 Printer Mode or Terminal Mode
- SW1-3 8 or 7-bit data code table
- SW1-4 ASCII Wheel or other
- SW2-1 Half-duplex or full-duplex transmission (Terminal Mode only)
- SW2-4 8 or 7-bit data length
- SW2-5 Even or Odd parity
- SW2-6 ~ 2-8 Transmission speed (baud rate)

● Remaining DIP Switch Settings

Refer to the tables given in Appendix B to set the 1-5, 1-6, 2-2, and 2-3 switches. Setting these switches tell the following to the IF-60:

- SW1-5 Paper length
SW1-6 Auto skip perforation mode or not
SW2-2 DC-1/DC-3 control enabled or not
SW2-3 Auto line feed required or not

● Booting Your System

Plug the power cord of each component into AC outlets and turn ON your system in the following sequence:

- (1) Computer or Modem
- (2) Typewriter

Confirm that the Power Indicator of the IF-60 is lit.

Note:

When switching your system OFF, simply reverse the above sequence.

Keyboard Configuration & I/O Codes

Appendix E

- **ASCII Keyboard Layout and I/O Codes**

CX Series

ESC	}		7D	!	21	22	#	23	\$	24	%	25	&	26	27	(28)	29	-	3F	~	3D	^	7E	BS								
1B]		5D	1	31	2	32	3	33	4	34	5	35	6	36	7	37	8	38	9	39	0	30	-	2D	^	5E	08						
			ESC		FS		GS		RS		US				5C		7C																	
	HT		Q	51	W	57	E	45	R	52	T	54	Y	59	U	55	I	49	O	4F	P	50	,	60	{	7B								
			q	71	w	77	e	65	r	72	t	64	y	79	u	75	i	69	o	6F	p	70	@	40	}	5B								
	09		DC1		ETB		ENQ		DC2		EM		NAK		HT		SI		DLE		NUL				CR									
			A	41	S	53	D	44	F	46	G	47	H	48	J	4A	K	4B	L	4C	+	2B	*	2A		0D								
			a	61	s	73	d	64	f	66	g	67	h	68	j	6A	k	6B	l	6C	=	3B	^	3A										
	SHIFT LOCK		SOH		DC3		EOT		ACK		BEL		BS		LF		VT		FF															
			Z	5A	X	58	C	43	V	56	B	42	N	4E	M	4D	<	3C	>	3E	?	3F												
			z	7A	x	78	c	63	v	76	b	62	n	6E	m	6D	<	2C	>	2E	/	2F												
	SHIFT		SUB		CAN		ETX		SYN		STX		SO		CR + LF								SHIFT											
			SPACE																															
																													DEL					
																															7F			

AX Series

ESC	<table><tr><td>1</td><td>21</td><td>*</td><td>22</td><td>#</td><td>23</td><td>\$</td><td>24</td><td>%</td><td>25</td><td>&</td><td>26</td><td>27</td><td>(</td><td>28</td><td>)</td><td>29</td><td>=</td><td>30</td><td>=</td><td>3D</td><td>^</td><td>7E</td></tr><tr><td>1</td><td>31</td><td>2</td><td>32</td><td>3</td><td>33</td><td>4</td><td>34</td><td>5</td><td>35</td><td>6</td><td>36</td><td>7</td><td>37</td><td>8</td><td>38</td><td>9</td><td>39</td><td>0</td><td>30</td><td>-</td><td>2D</td><td>^</td><td>5E</td></tr></table>																										1	21	*	22	#	23	\$	24	%	25	&	26	27	(28)	29	=	30	=	3D	^	7E	1	31	2	32	3	33	4	34	5	35	6	36	7	37	8	38	9	39	0	30	-	2D	^	5E																													
	1	21	*	22	#	23	\$	24	%	25	&	26	27	(28)	29	=	30	=	3D	^	7E																																																																															
1	31	2	32	3	33	4	34	5	35	6	36	7	37	8	38	9	39	0	30	-	2D	^	5E																																																																															
1B	<table><tr><td colspan="2">ESC</td><td colspan="2">FS</td><td colspan="2">GS</td><td colspan="2">RS</td><td colspan="2">US</td><td colspan="2">5C</td><td colspan="2">7C</td><td colspan="2"></td><td colspan="2"></td><td colspan="2"></td><td colspan="2"></td><td colspan="2"></td></tr></table>																										ESC		FS		GS		RS		US		5C		7C																																																															
ESC		FS		GS		RS		US		5C		7C																																																																																										
	HT	<table><tr><td>Q</td><td>51</td><td>W</td><td>57</td><td>E</td><td>45</td><td>R</td><td>52</td><td>T</td><td>54</td><td>Y</td><td>59</td><td>U</td><td>55</td><td>I</td><td>49</td><td>O</td><td>4F</td><td>P</td><td>50</td><td>.</td><td>60</td><td>(</td><td>7B</td><td>BS</td></tr><tr><td>q</td><td>71</td><td>w</td><td>77</td><td>e</td><td>65</td><td>r</td><td>72</td><td>t</td><td>64</td><td>y</td><td>79</td><td>u</td><td>75</td><td>i</td><td>69</td><td>o</td><td>6F</td><td>p</td><td>70</td><td>@</td><td>40</td><td>[</td><td>5B</td><td>08</td></tr></table>																										Q	51	W	57	E	45	R	52	T	54	Y	59	U	55	I	49	O	4F	P	50	.	60	(7B	BS	q	71	w	77	e	65	r	72	t	64	y	79	u	75	i	69	o	6F	p	70	@	40	[5B	08																									
		Q	51	W	57	E	45	R	52	T	54	Y	59	U	55	I	49	O	4F	P	50	.	60	(7B	BS																																																																												
q	71	w	77	e	65	r	72	t	64	y	79	u	75	i	69	o	6F	p	70	@	40	[5B	08																																																																														
09	<table><tr><td colspan="2">DC1</td><td colspan="2">ETB</td><td colspan="2">ENQ</td><td colspan="2">DC2</td><td colspan="2">DC4</td><td colspan="2">EM</td><td colspan="2">NAK</td><td colspan="2">HT</td><td colspan="2">SI</td><td colspan="2">DLE</td><td colspan="2">NUL</td><td colspan="2"></td></tr></table>																										DC1		ETB		ENQ		DC2		DC4		EM		NAK		HT		SI		DLE		NUL																																																							
DC1		ETB		ENQ		DC2		DC4		EM		NAK		HT		SI		DLE		NUL																																																																																		
	SHIFT LOCK	<table><tr><td>A</td><td>41</td><td>S</td><td>53</td><td>D</td><td>44</td><td>F</td><td>46</td><td>G</td><td>47</td><td>H</td><td>48</td><td>J</td><td>4A</td><td>K</td><td>4B</td><td>L</td><td>4C</td><td>+</td><td>2B</td><td>*</td><td>2A</td><td>}</td><td>7D</td><td rowspan="2">CR</td></tr><tr><td>a</td><td>61</td><td>s</td><td>73</td><td>d</td><td>64</td><td>f</td><td>66</td><td>g</td><td>67</td><td>h</td><td>68</td><td>j</td><td>6A</td><td>k</td><td>6B</td><td>l</td><td>6C</td><td>=</td><td>3B</td><td>-</td><td>3A</td><td>]</td><td>5D</td></tr></table>																										A	41	S	53	D	44	F	46	G	47	H	48	J	4A	K	4B	L	4C	+	2B	*	2A	}	7D	CR	a	61	s	73	d	64	f	66	g	67	h	68	j	6A	k	6B	l	6C	=	3B	-	3A]	5D																										
		A	41	S	53	D	44	F	46	G	47	H	48	J	4A	K	4B	L	4C	+	2B	*	2A	}	7D	CR																																																																												
a	61	s	73	d	64	f	66	g	67	h	68	j	6A	k	6B	l	6C	=	3B	-	3A]	5D																																																																															
	SHIFT	<table><tr><td colspan="2">SOH</td><td colspan="2">DC3</td><td colspan="2">EOT</td><td colspan="2">ACK</td><td colspan="2">BEL</td><td colspan="2">BS</td><td colspan="2">LF</td><td colspan="2">VT</td><td colspan="2">FF</td><td colspan="2"></td><td colspan="2"></td><td colspan="2">0D</td></tr><tr><td colspan="2">Z</td><td>5A</td><td>X</td><td>58</td><td>C</td><td>43</td><td>V</td><td>56</td><td>B</td><td>42</td><td>N</td><td>4E</td><td>M</td><td>4D</td><td><</td><td>3C</td><td>></td><td>3E</td><td>?</td><td>3F</td><td colspan="2"></td><td colspan="2"></td></tr><tr><td colspan="2">SUB</td><td colspan="2">CAN</td><td colspan="2">ETX</td><td colspan="2">SYN</td><td colspan="2">STX</td><td colspan="2">SO</td><td colspan="2">CR+LF</td><td colspan="2"></td><td colspan="2"></td><td colspan="2"></td><td colspan="2"></td><td colspan="2"></td><td colspan="2">SHIFT</td></tr></table>																										SOH		DC3		EOT		ACK		BEL		BS		LF		VT		FF						0D		Z		5A	X	58	C	43	V	56	B	42	N	4E	M	4D	<	3C	>	3E	?	3F					SUB		CAN		ETX		SYN		STX		SO		CR+LF												SHIFT	
		SOH		DC3		EOT		ACK		BEL		BS		LF		VT		FF						0D																																																																														
Z		5A	X	58	C	43	V	56	B	42	N	4E	M	4D	<	3C	>	3E	?	3F																																																																																		
SUB		CAN		ETX		SYN		STX		SO		CR+LF												SHIFT																																																																														
SPACE																																																																																																						
																										DEL		7F																																																																										

Upper case character — **G** 47 — I/O code name — **CR**

Lower case character — **g** 67 — I/O code (hex)

I/O control code(s) when using **[code]** key — **BEL** — I/O code (hex) — **0D**

● Additional Control

Pressing the **[M]** key while the **[CODE]** key is held down generates a code that depends on the DIP Switch 2-3 setting:

SW 2-3	[CODE] + [M]
UP	CR
DOWN	CR + LF

● Extra Characters

Pressing one of the **[7]**, **[8]**, **[9]**, **[0]**, **[—]** or **[+]** key while the **[CODE]** key is held down allows for extra character output. These extra characters are indicated in green color on the keys mentioned above and differ from country to country. Please refer to the following table.

Country or Area	CODE +						CODE + (international)					
	7	8	9	0	—	+	7	8	9	0	—	+
American English	<	¶	>	§	2	3						
American Spanish							*	#	ß	¥	ç	

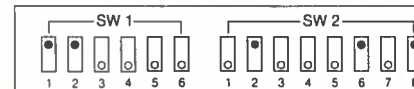
4. How to Set the DIP Switches

The IF-60 can only correctly transmit the data to your typewriter if the DIP Switches are properly set before you start using your system.

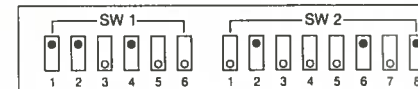
The principal settings for Printer Mode are explained in Appendix A just after the cable specifications corresponding to each computer. Here are the principal settings for the Terminal Mode:

For 300 bps, 8 bits, No Parity

Normal

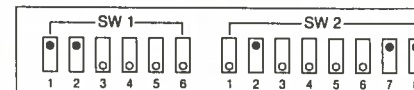


With ASCII Wheel (sold separately)



For 1200 bps, 8 bits, No Parity

Normal

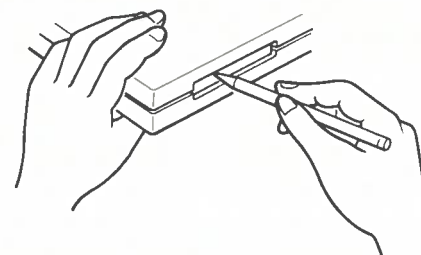


With ASCII Wheel (sold separately)



Other settings are necessary to provide the IF-60 with information about the paper length, etc. These settings will be explained later.

For detailed information about the function of each switch, please refer to Appendix B.



For setting the DIP switches, use a pencil.

3. How to Select the Proper Computer or Modem Cable

Modems usually come with an appropriate RS-232C compatible cable. If no cable is provided, use a NULL MODEM cable (see page 25).

Computers, however, use many different types of connectors, so you will have to be careful to select the appropriate cable for your computer. The information you need to select the proper cable is given in Appendix A:

Model	Appendix A, page
IBM-PC and Compatibles	18
IBM PCjr	21
APPLE II, IIe	23
APPLE IIc.....	27
MACINTOSH.....	29
COMMODORE 16, 64, 128.....	31
ATARI 600, 800, 1200 XL.....	33
TI 99/4A.....	35
TRS 80 Model III (TANDY)	37
SINCLAIR QL.....	39
BBC MICRO COMPUTER.....	40

Available Daisy Wheels Appendix F

b ₇ b ₆ b ₅ b ₄	0	1	2	3	4	5	6	7
0 0 0 0	NUL	!	1	A	Q	a	q	
0 0 0 1	DC1	"	2	B	R	b	r	
0 0 1 0	2	#	3	C	S	c	s	
0 0 1 1	3	\$	4	D	T	d	t	
0 1 0 0	4	%	5	E	U	e	u	
0 1 0 1	5	&	6	F	V	f	v	
0 1 1 0	6	'	7	G	W	g	w	
0 1 1 1	7	BEL	(	8	H	X	h	x
1 0 0 0	8	BS CAN	)	9	I	Y	i	y
1 0 0 1	9	HT	*	J	Z	j	z	
1 0 1 0	A	LF	+	K	[	k	[
1 0 1 1	B	VT ESC	<	L	\	l	\	
1 1 0 0	C	FF	=	M	]	m]	
1 1 0 1	D	CR	>	N	^	n	^	
1 1 1 0	E	RS	/	? O	_	o	_	
1 1 1 1	F	US						

ASCII

b ₇ b ₆ b ₅ b ₄	0	1	2	3	4	5	6	7
0 0 0 0	NUL	!	1	A	Q	a	q	
0 0 0 1	DC1	"	2	B	R	b	r	
0 0 1 0	2	#	3	C	S	c	s	
0 0 1 1	3	\$	4	D	T	d	t	
0 1 0 0	4	%	5	E	U	e	u	
0 1 0 1	5	&	6	F	V	f	v	
0 1 1 0	6	'	7	G	W	g	w	
0 1 1 1	7	BEL	(	8	H	X	h	x
1 0 0 0	8	BS CAN	)	9	I	Y	i	y
1 0 0 1	9	HT	*	J	Z	j	z	
1 0 1 0	A	LF	+	K	[	k	[
1 0 1 1	B	VT ESC	<	L	\	l	\	
1 1 0 0	C	FF	=	M	]	m]	
1 1 0 1	D	CR	>	N	^	n	^	
1 1 1 0	E	RS	/	? O	_	o	_	
1 1 1 1	F	US						

AMERICAN SPANISH

b ₇ b ₆ b ₅ b ₄	0	1	2	3	4	5	6	7
0 0 0 0	NUL	!	1	A	Q	a	q	
0 0 0 1	DC1	"	2	B	R	b	r	
0 0 1 0	2	#	3	C	S	c	s	
0 0 1 1	3	\$	4	D	T	d	t	
0 1 0 0	4	%	5	E	U	e	u	
0 1 0 1	5	&	6	F	V	f	v	
0 1 1 0	6	'	7	G	W	g	w	
0 1 1 1	7	BEL	(	8	H	X	h	x
1 0 0 0	8	BS CAN	)	9	I	Y	i	y
1 0 0 1	9	HT	*	J	Z	j	z	
1 0 1 0	A	LF	+	K	[	k	[
1 0 1 1	B	VT ESC	<	L	\	l	\	
1 1 0 0	C	FF	=	M	]	m]	
1 1 0 1	D	CR	>	N	^	n	^	
1 1 1 0	E	RS	/	? O	_	o	_	
1 1 1 1	F	US						

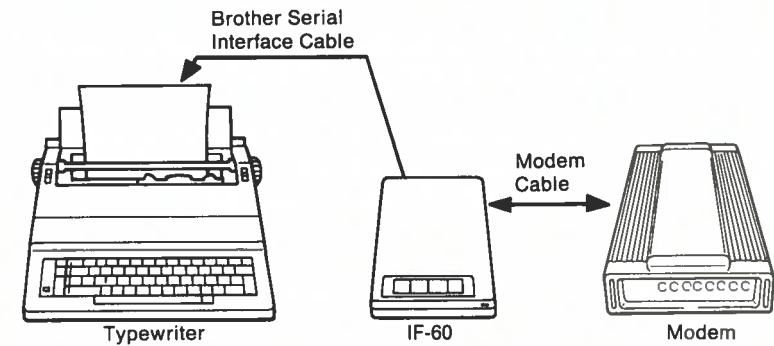
AMERICAN ENGLISH

b ₇ b ₆ b ₅ b ₄	0	1	2	3	4	5	6	7
0 0 0 0	NUL	!	1	A	Q	a	q	
0 0 0 1	DC1	"	2	B	R	b	r	
0 0 1 0	2	#	3	C	S	c	s	
0 0 1 1	3	\$	4	D	T	d	t	
0 1 0 0	4	%	5	E	U	e	u	
0 1 0 1	5	&	6	F	V	f	v	
0 1 1 0	6	'	7	G	W	g	w	
0 1 1 1	7	BEL	(	8	H	X	h	x
1 0 0 0	8	BS CAN	)	9	I	Y	i	y
1 0 0 1	9	HT	*	J	Z	j	z	
1 0 1 0	A	LF	+	K	[	k	[
1 0 1 1	B	VT ESC	<	L	\	l	\	
1 1 0 0	C	FF	=	M	]	m]	
1 1 0 1	D	CR	>	N	^	n	^	
1 1 1 0	E	RS	/	? O	_	o	_	
1 1 1 1	F	US						

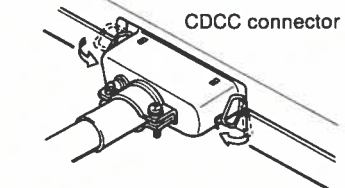
SYMBOL

● Terminal Mode

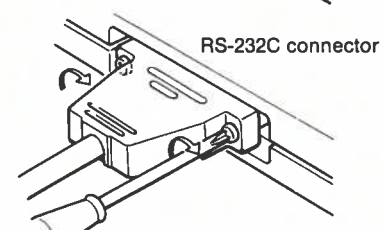
In Terminal Mode, the RS-232C Connector of the IF-60 is ALWAYS used to connect the Modem.



The following illustrations show how to secure the connectors properly.



After inserting the connector, press the securing clips against the connector. You will hear a click.



After inserting the connector, tighten the securing screws.

★ Improperly secured connectors may cause transmission errors.

CAUTION:

Before setting up your system, be sure to unplug all the components from their AC outlet. Also turn all components off.

b ₆ — — —	0	0	0	0	0	0	0	0
b ₇ — — —	0	0	0	0	1	1	1	1
b ₈ — — —	0	0	1	1	0	0	1	1
b ₉ — — —	0	1	0	1	0	1	0	1
b ₂ b ₁ b ₂ b ₁	0	1	2	3	4	5	6	7
0 0 0 0	0	NUL			0	B	P	p
0 0 0 1	1				1	A	Q	a q
0 0 1 0	2				2	B	R	b r
0 0 1 1	3				3	C	S	c s
0 1 0 0	4				4	D	T	d t
0 1 0 1	5				5	E	U	e u
0 1 1 0	6				6	F	V	f v
0 1 1 1	7				7	G	W	g w
1 0 0 0	8	BS	CAN	(	8	H	X	h x
1 0 0 1	9	HT		)	9	I	Y	i y
1 0 1 0	A	LF		*		J	Z	j z
1 0 1 1	B	VT	ESC	+		K	=	k #
1 1 0 0	C	FF		,		L	N	l ñ
1 1 0 1	D	CR		-		M	¿	m ç
1 1 1 0	E		RS			N		n
1 1 1 1	F		US	/		O	_	o v

INTERNATIONAL

2. Overview of Your System

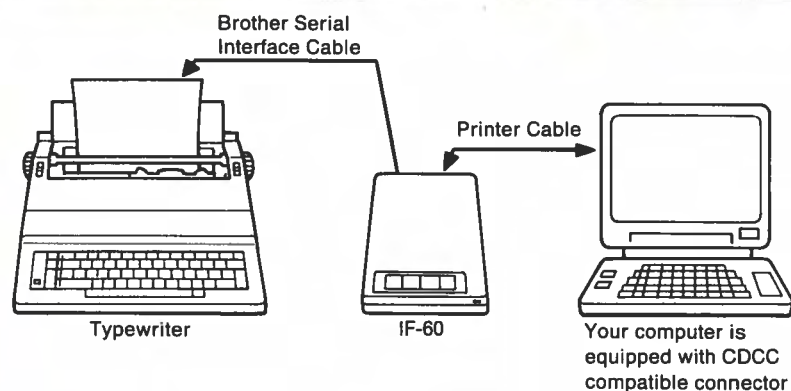
● Printer Mode

There are, in principle, two ways to connect your computer to your typewriter via the IF-60:

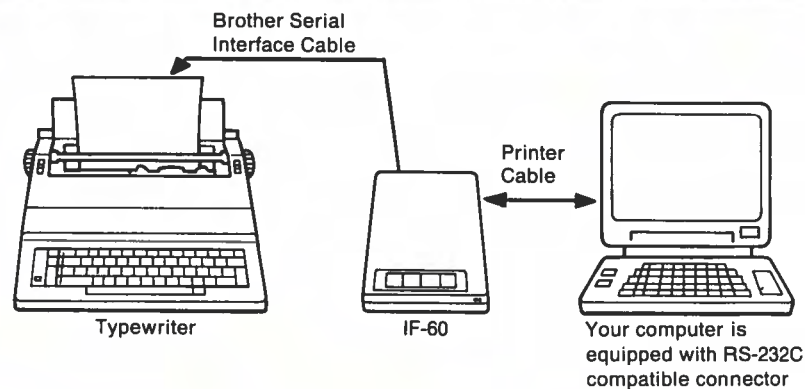
- CDCC connection
- RS-232C connection

The kind of connection you will choose depends on which type of connector (CDCC or RS-232C) is available on your computer.

CDCC CONNECTION



RS-232C CONNECTION



Specifications

Appendix G

● General Specifications

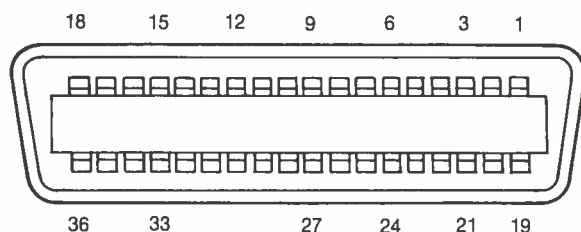
INTERFACE	CENTRONICS PARALLEL RS-232C SERIAL
MODE	TYPEWRITER, PRINTER, TERMINAL
BUFFER MEMORY	8K byte
PRINT DIRECTION	BI-DIRECTIONAL (Logic seeking)
TEMPERATURE	10 ~ 40°C (during operation)
HUMIDITY	20 ~ 80% (during operation) No dew condensation to be tolerated.
DIMENSIONS	131.5 (W) x 204.2 (D) x 30.0 (H) mm

The styling and specifications are subject to change without notice, as changes may be made to improve performance.

Centronics Parallel Interface

● Table of Connector Signals

Number of Terminals	Name of Signals	Number of Terminals	Name of Signals
1	DATA STROBE	19	TWISTED PAIR GND
2	DATA 1	20	TWISTED PAIR GND
3	DATA 2	21	TWISTED PAIR GND
4	DATA 3	22	TWISTED PAIR GND
5	DATA 4	23	TWISTED PAIR GND
6	DATA 5	24	TWISTED PAIR GND
7	DATA 6	25	TWISTED PAIR GND
8	DATA 7	26	TWISTED PAIR GND
9	DATA 8	27	TWISTED PAIR GND
10	ACKNLG	28	TWISTED PAIR GND
11	BUSY	29	TWISTED PAIR GND
12	PE	30	INPUT PRIME RET
13	SLCT	31	INPUT PRIME
14		32	FAULT
15		33	
16	0V	34	
17	0V	35	
18		36	



● Control Panel

SEL

The Control Panel is used to operate the typewriter—and looks like the control panel of a printer. Pressing the **SEL** switch once after the IF-60 is powered on turns the SEL LED on; pressing again turns this LED off.



SEL LED is ON.
(Printer/Terminal mode)



The IF-60 is ready for transmission.
Initializing any margin and/or tab settings.



SEL LED is OFF.
(Typewriter mode)

The typewriter can be used for direct typing.

Margin and tab settings are possible.

LF, **FF**, and **PITCH** keys are enabled.

LF

Line Feed. Used to move the paper one line up.

FF

Form Feed. Used to move the paper one page up.

PITCH

Selects the printing pitch (10, 12, 15). The PITCH LEDs indicate the selection.

● Power Indicator

This indicator lights when the IF-60 is powered.

● Side Connector

This RS-232C connector is used to connect the IF-60 to your computer or your Modem.

● Rear Connector

This CDCC connector is used to connect the IF-60 to your computer.

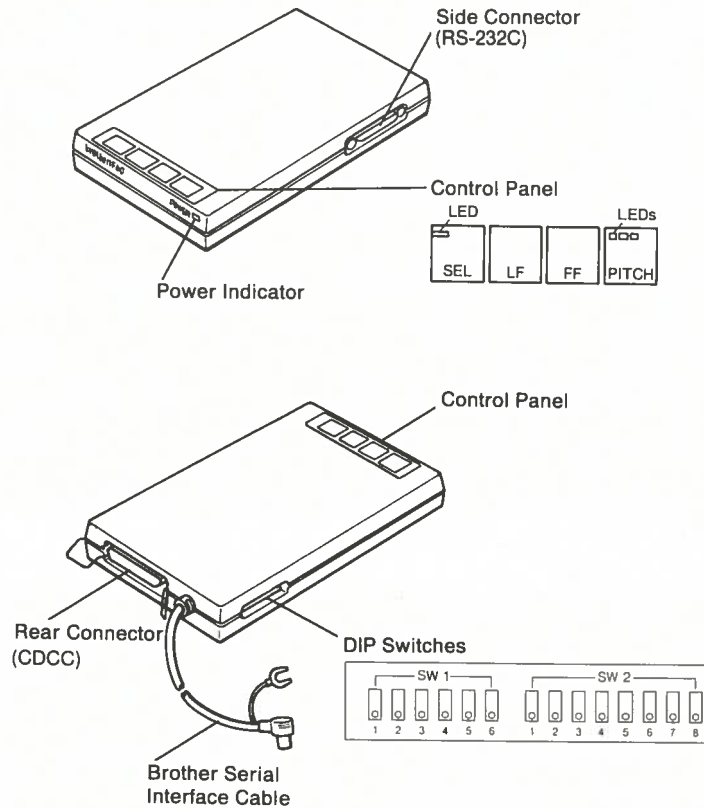
● Dip Switch

These switches should be set before you start using the IF-60. They tell the IF-60 in which parameters it is supposed to work.

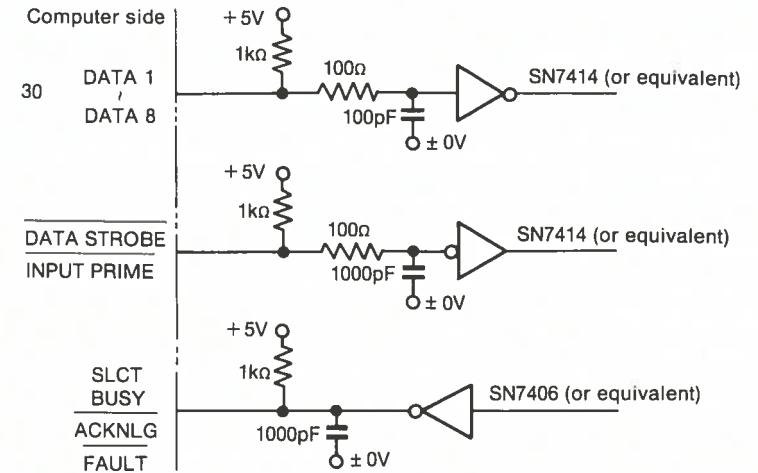
● Brother Serial Interface Cable

Connects the IF-60 to the typewriter. The IF-60 is powered through this cable when the typewriter is turned on.

1. A First Look at the IF-60



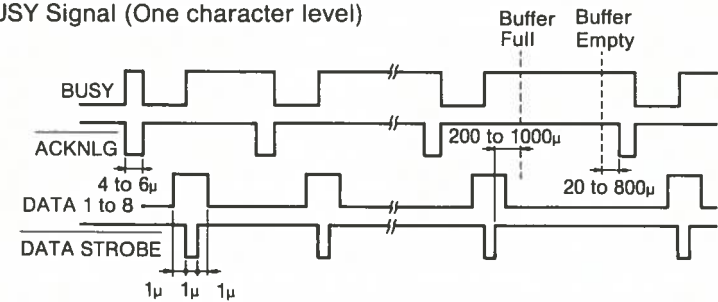
● Interface Circuit



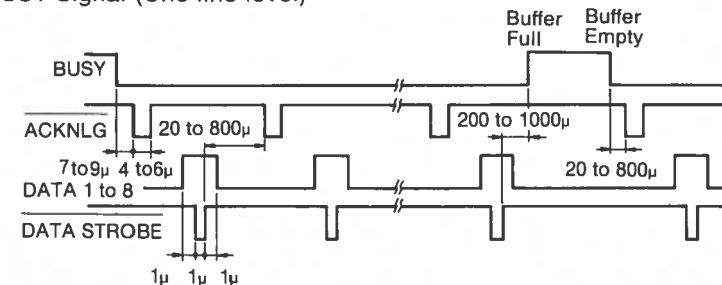
● Timing Chart

- * Standard specification (One Character Busy)
- * Option (One Line Busy)

1) BUSY Signal (One character level)



2) BUSY Signal (One line level)



RS-232C Serial Interface

● Basic Specifications

Communication Speed	110, 150, 300, 600, 1200, 2400, 4800 9600 (Baud)										
Synchronization	Start-Stop										
Communication Control Protocol	No Protocol										
Data Style	<div>10 bits/character</div> <div><div>direction of transmission →</div><table><tr><td>SP</td><td>b₈</td><td>b₇</td><td>b₆</td><td>b₅</td><td>b₄</td><td>b₃</td><td>b₂</td><td>b₁</td><td>ST</td></tr></table></div> <div>Start of character is the first shift (Start Bit) from MARK to SPACE.</div> <div>If without Line data, it is MARK mode.</div> <div>ST Start Bit</div> <div>b₁ ~ b₇ Data Bits</div> <div>(LSB is b₁)</div> <div>b₈ Parity Bit</div> <div>(At 8-bits data — MSB data)</div> <div>SP Stop Bit</div>	SP	b ₈	b ₇	b ₆	b ₅	b ₄	b ₃	b ₂	b ₁	ST
SP	b ₈	b ₇	b ₆	b ₅	b ₄	b ₃	b ₂	b ₁	ST		
Error Printing	Upon trouble by Vertical Parity Error, Framing Error, Over-Run Error, 40H of SYMBOL is printed.										

OPERATION GUIDE

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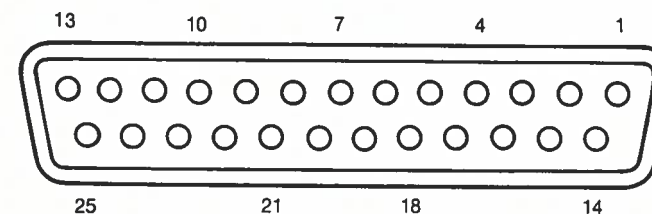
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● Level of Signals

Logic	Ordinary Voltage	Receiving-End Voltage
MARK (OFF)	- 12V	- 3V or less
SPACE (ON)	+ 12V	+ 3V or more

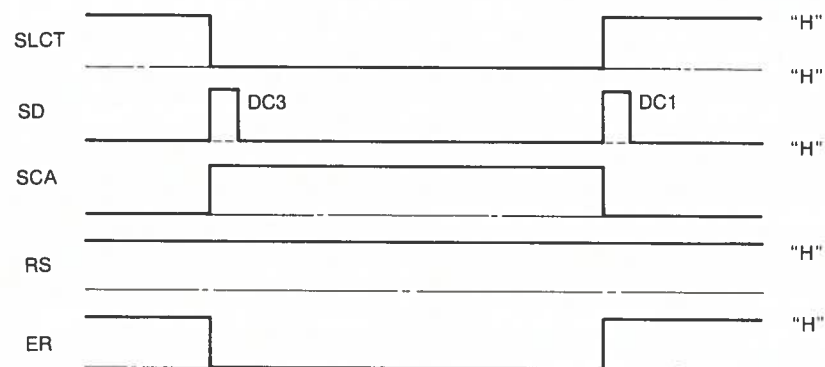
● Connector & Pin-Arrangement

No. of Terminal	Name of Signals	Code	Computer ↔ IF-60
1	Earth for Safety	FG	↔
2	Transmission Data	SD	←
3	Reception Data	RD	→
4	Requirement for Transmission	RS	←
5	Transmission Possible	CS	→
6	Data Set Ready	DR	→
7	Earth for Signals	SG	↔
8	Carrier Detection	CD	→
11	Reverse Channel	SCA	←
20	Data Terminal Ready	ER	←



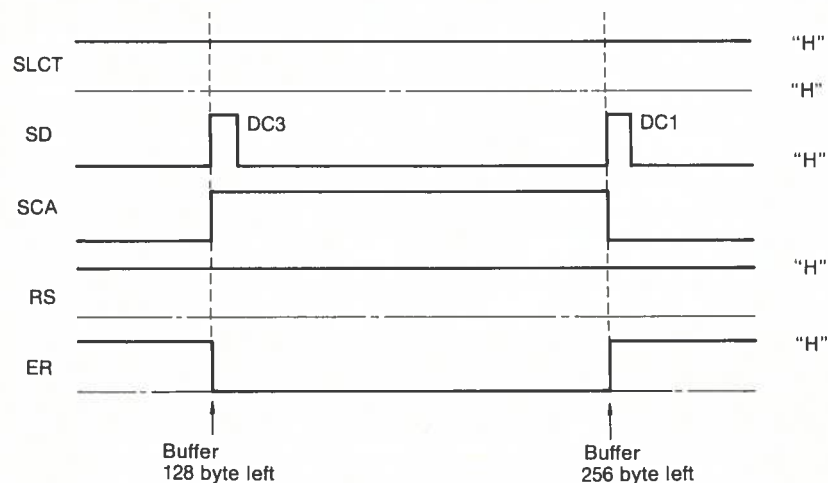
● Timing Chart

1) Timing Chart by SLCT



- 1 SLCT → "L"In case of: SELECT SW. "OFF"
DC3 code input
- 2 SLCT → "H"When above conditions are cancelled.

2) Timing Chart by BUFFER



Introduction

Congratulations on your purchase of the IF-60 Interface Unit. This unit will allow you to use your Brother Electronic Typewriter as a Letter-Quality Daisy Wheel Printer and Basic Protocol Terminal.

The IF-60 can be used in two ways:

● Printer Mode

For interfacing your computer with your Brother Typewriter, which is most suitable to word processing. The IF-60 is compatible with most of the popular personal computers.

● Terminal Mode

For interfacing a Modem with your Brother Typewriter.

This manual is designed to help you get the most from the IF-60 —and learn how to use it in the shortest time possible. So please read it carefully and keep it in a safe place for future reference.

Note:

The intent of this manual is to provide as much operational and technical information as possible for interfacing the Brother Typewriter to your computer or modem.

Since it is not practical to include specific information on each and every maker and model of computer, the enclosed written examples and functional codes are presented in a computer format similar to the needs of a wide range of software.

Thus, it is the user's responsibility to gather the necessary information and equipment to interface the typewriter with his/her individual computer.

However, it should be noted that the specifications enclosed with your computer and software manuals are indispensable for a safe and satisfactory connection.